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New terminology of differentiating digital facsimiles

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Summary: The introduction of new terms is often needed to describe the methods or products brought about by the technical and theoretical development in cartography. The standardization of terms that describe the transformation of old cartographic products into digital form is a current issue. This paper explains some new terms by concrete examples taken from a running project that aims at making the digital facsimile of the largest Hungarian globe made in 1862. The paper discusses the differences between the terms facsimile (printed after colour separation), technological facsimile and digital (virtual) facsimile. The virtual facsimiles are classified into two types: one that registers the present state of the cartographic product, and the other that displays the original state, when the product was made. The virtual facsimile of the original state can be used for the digital virtual as well as physical restoration of the damaged parts of the old product. It is even possible to make a virtual reconstruction if large areas are damaged. At the final stage, the product may be physically recreated or reconstructed so that it shows how it looked like originally. The facsimiles of several globes are already placed in the Virtual Globes Museum developed by Prof. Márton at the Department of Cartography and Geoinformatics.

Introduction

New terms are often introduced or re-worded due to the technical and theoretical development in cartography. Sometimes the terminology barrier is much stronger than the language barrier among cartographers. The standardization of terminology means the consistent usage of technical terms as well as the clarification of theoretical terms. The standardization of those relatively new terms that describe the transformation of old cartographic products into digital form is a current issue.

There are unique and several hundred years old cartographic products which exist in one or two copies only. These important works of cartography contain lots of information that are of historical, scientific, or cultural interest. Many of these documents may not be found in public museums, because they are most carefully kept in libraries, archives or by private collectors. Some of these documents are occasionally reprinted and are available as expensive facsimile copies. These reprints or facsimiles are usually produced by the colour separation of photographs taken of the original copy of the owner. The documents are reproduced in close to their original form. As a result, the new prints are in fact copies of the present state of the map. This explains why the various reprints, if they are made after different copies held by various owners, will not be quite identical.

Changes in the technology of copying – rather image processing (such as scanning or the recreation of the map by the original methods) – raise the demand of refining the meaning of the terms *facsimile*, *technological facsimile, digital facsimile, virtual facsimile* and *contemporary facsimile*. The word, *facsimile* comes from the Latin language: *facere* (to make), and *similis* (like). The *Encyclopedic Dictionary of Cartography in 25 languages* – published somewhat more than ten years ago – says the following: "817.7 facsimile map: A printed reproduction of an Old Map (…) identical with the original" (Neumann, 1997: 419). However, what does the expression, "identical with the original" mean? May it mean the reproduction of the present state of the map? Generally, this

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approach is accepted. This paper will discuss the meaning of the above term in the light of a new project.

The Department of Cartography and Geoinformatics has recently started a project to save the cartographic heritage of globe making in Hungary. The final product will be a collection of the three-dimensional facsimiles of Hungarian and Hungary-related earth and celestial globes in a virtual museum, which will be accessible through the Internet. The method developed in the project will also offer a useful tool for the restoration and even reconstruction of old, historical and damaged globes (Gede and Márton, 2010: 279–290).

Terms and products

At the beginning of the work, when we started taking digital photographs of the globes and scanning the available globe prints, we realized that some of the technical terms are understood and explained in different ways by various authors. In the first step, the new terms used in the processing of globes by digital methods had to be introduced, defined and standardized.

The *printed facsimiles* in general may be

- Copies which are made after the colour separation of high resolution photographs of the original products *(traditional facsimiles)*. In this case, the outcome will show the present state of the colours as well as of the textual and graphic elements of the map.
- Copies made after scanning the original product *(digital facsimiles)*. The outcome – either printed or virtual – will be basically the same as above, namely, the present colours are reproduced.
- Copies made by using the technology available in the time of making the original *(technological facsimiles)*.

The further processing of digital photographs or scanned maps will result in a product named *virtual facsimile*. The outcome will be copies which are in fact computer images of the document. However, if the accidental damage and the faded colours of the available products are reproduced, there will be great differences between the *present state* and the *original state*. In many cases, the present state of the map is not the same as that of the original. (Unfortunately, sometimes we have information about the original colours only from descriptions.) If the present state is considered identical to its original state, the facsimile reproduction – either a printed or virtual product – will be considered a *contemporary facsimile*.

As for the globes, it is most advantageous if their map prints are available for digital processing, because it is always easier to work with map sheets than with real globes (Hruby et al 2005). The map prints of the segments of the globe have almost always been preserved in a much better state. The original map prints of the globes are normally kept in files and protected from illumination. On the other hand, the globes suffer from the light and air too. In addition, the exhibited globes are much more exposed to physical damage. This explains why the colours of the globes fade in time even if they were carefully handled. As a result, those virtual globes that are made by processing their map prints will most reliably show the content of the globes at the time of their making. To demonstrate the physical (first of all, colour) changes in time, let us look at the differences between the present state and original state of two globes of different ages (Figures 1–2 and Figures 3–4).

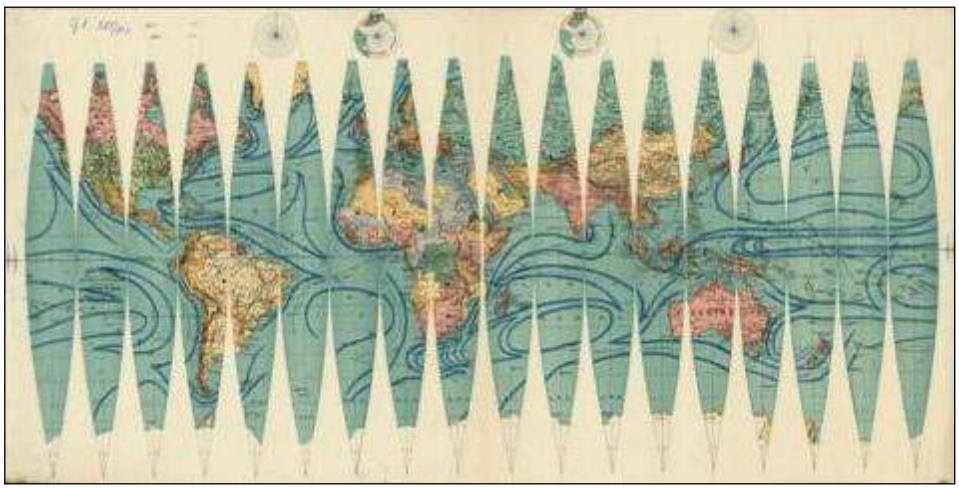

Figure 1: The original map print of a 25.5 cm diameter globe made by Manó Kogutowicz in 1905

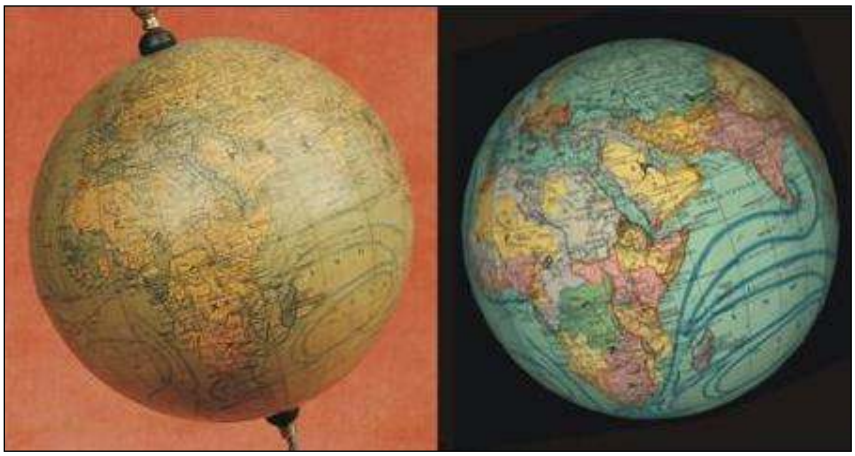

Figure 2: The globe today and the colour-true virtual image compiled from the prints

Figure 3: The present state of the 40 cm diameter detachable structural morphological Earth model (Hajdu and Márton, 1986)

Figure 4: The contemporary state of the same globe digitally reproduced using the original map prints.

The damaged parts of a map are usually restored by restorers after studying the undamaged parts of identical or similar publications. If this *restoration* is first digitally carried out on the screen and not on the physical reality of the map or globe, then we arrive at the term, *virtual restoration*. Today, it seems practical if all kinds of restoration are preceded by virtual restoration. This procedure cannot damage the original, which is often the only one. Working out the methods for the virtual restoration of old or historical globes is of major importance in the planning of the physical restoration of globes. This will ensure the restoration without the risk of causing further damage on the existing copies. All physical restorations of earth or celestial globes should be preceded by the digital processing of their content.

In those cases when the product cannot be virtually restored any more because large areas are illegible on the globe and they cannot be interpreted or the globe was destroyed, it may be necessary to re-create the globe as a whole by using the available prints. This process will be a *reconstruction* instead of restoration, and if the procedure is carried out on the screen of the computer, then it is called *virtual reconstruction*. The digital methods of both the virtual restoration and virtual reconstruction will result in contemporary facsimiles. The globe below (Figure 5) is the virtual reconstruction from the prints of its segments. As we do not have the globe itself in Hungary, only the prints are available, it would be interesting to compare the reconstructed virtual globe with its real counterpart.

Figure 5: A 10.5 cm diameter globe virtually reconstructed from prints made by Kartographische Institut, Berlin, 1878.

The virtual reconstruction can be useful when preparing for the physical reconstruction or recreation of old globes that will show how the product looked like originally. This method also allows

us to make new globes from the images of old maps (Figure 6). The representation of historical maps on virtual globes is not an old idea. Among the pioneers of this method is the Hungarian Gyula Pápay, professor of the Department of History at the University of Rostock in Germany (Pápay, 2006).

Figure 6: Computer image of the virtual globe of Strabo (Pápay, 2006).

The virtual facsimiles (digitally recorded images) of several globes have already been placed in a web-museum, the Virtual Globes Museum developed by Prof. Márton at the Department of Cartography and Geoinformatics. In this way, the globes brought together from multiple sources can be easily studied in details by analyzing their digitized representations. This virtual exhibition, for instance, will be a powerful tool for the interpretation and comparative study of the cartographic content of the globes from the same age.

Finally, some examples of facsimiles are presented taken from a running project that aims at making the digital facsimile of the largest Hungarian globe (Figure 7). The globe made by László Perczel (1827–1879) is a large one: its diameter is 132 cm. This size means that the scale of the globe is 1 : 10 million. The manuscript globe was completed by 1862 and is now kept in the Map Room of the National Széchényi Library in Budapest. Unfortunately, the globe has been badly damaged in several places: the upper lacquer layer has turned to dark yellow, and many of the names have become illegible by now. This means the restoration will not be an easy task if they wish to complete the work by 2012, when the globe will be just 150 years old. It is still possible to register digitally the present state of the globe (to produce the virtual facsimile of the globe) and later to recreate digitally the product in the form of a virtual contemporary facsimile that would present the original colours and graphics. For this purpose, it is also important to find the sources the author used in the mid 19th century. The plan is that both the virtual facsimile and the contemporary facsimile of this unique globe will be placed in the Virtual Globes Museum (http://vgm.elte.hu).

Figure 7: Perczel's badly damaged globe. Present state of the globe and the digital facsimiles of the same area showing the original state of the globe.

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